The impact of exchange rate on exports in South Africa.

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The impact of exchange rate on exports in South Africa. The ARDL bounds test approach

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ABSTRACT

The primary objective of this study is to assess the impact of exchange rate on exports in South Africa between the periods 1994 to 2016 and to establish whether a statistically significant relationship exists between exports and exchange rate. The study incorporated real interest rate, investments and inflation as control variables. By applying the Autoregressive Distributed Lag (ARDL) approach, this study empirically investigates the impact of real exchange rate on exports in South Africa. In testing for the unit root properties of the time series data, the variables were subjected to the Augmented Dickey-Fuller (ADF) and Philips Perron (PP) unit root tests. The results obtained reveal that exchange rate has a significant negative relationship with exports in South Africa.

Keywords: Exchange rate, exports, Autoregressive Distribution Lag Model (ARDL), South Africa

JEL codes: C50; E00; F13

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1. INTRODUCTION

The increasing globalisation and the integration of the world economies into one village has created enormous opportunities for both developed and developing nations. Opportunities such as, access to advance technological innovation, mobility of real, capital and investment goods. However, such benefits came with their costs, amongst other is the extreme volatility of domestic currency more especially in developing countries, South Africa is no exception to this. To combat the negative impact of globalisation on its financial market, South Africa adopted a free-floating exchange rate system in an inflation target in February 2000. This means that the value of the rand is determined by the force of demand and supply in the foreign exchange rate market.

It is argued that free floating exchange rate is a double edge sword in that, although it allows for free mobility of capital and other investment instruments, the negative impact that the exchange rate variability has on exports negate the little benefits achieved through capital mobility (see Kočenda and Valachy, 2006; Choudhry, 2005). The study of the impact of exchange rate on exports thus became of outmost importance.

According to Trading Economics (2017) South African exports rose by 16.4 percent month-on-month to R101.2 billion in March 2017, mainly driven by higher sales of vehicles and transport equipment (19 percent), machinery and electronics (27 percent), precious metals and stones (33 percent), chemicals (17 percent) and mineral products (8 percent). Major destinations for exports were Germany (8.8 percent of total exports), China (8.7 percent), the US (6.2 percent), India (4.6 percent) and Botswana (4.4 percent). Exports from South Africa averaged R16233 million from 1957 until 2017, reaching an all-time high of R105163.26 million in June of 2016 (Trading economics, 2017).

One direct benefit of having steady increase in exports is job creation, and economic growth. According to the Organisation for Economic Co-operation and Development (OECD) on economic surveys in South Africa (2015), direct employment in the precious metal and stone industry, which is supported by African Growth Opportunity Act (AGOA) grew to 25,776. Export through AGOA is estimated to have created 62,395 jobs. In addition to metal and stone, many jobs have been created in South Africa due to its steady exporting of automobiles and other transportation equipment. It is undisputable that a stronger export sector drives job creation. Increasing exports, particularly in manufacturing, may be crucial for the low-skilled job creation needed to substantially reduce high overall and youth unemployment. And exports are especially critical amid South Africa’s widening current account deficit.

The significance or importance of the study can be viewed in at least two dimensions, one being that, the study may assist policy makers to implement exchange rate policies that promote exports, economic stability and relative stable currency. On the other hand, it would put exporters on vantage ground to address and avoid losses as the result of exchange rate arrangements.

The remainder of the paper is structured as follows: Section 2 presents the review of the empirical literature. Section 3 presents the model specification and the estimation technique followed by section 4 which discusses the empirical analysis of the study's results. Section 5 concludes the study and provides policy recommendations.

2. LITERATURE REVIEW

Increase in output production and export lead economy is by no doubt a catalyst to the growth of the Country. Trade enhances economic growth through job creation, investments in new machinery and equipment. According to Wondemu and Potts (2015), the debate on the direction of causality between exports and economic growth is contested. However, there is a consensus that exports is of paramount importance to the growth of the country, more especial developing economies. There are two theoretical frameworks discussed in the paper that explains the interaction between exchange rate and exports. The first framework postulate that a deprecation of domestic currency will have expansionary effect on trade. This is because a depreciated currency makes home exports relatively cheaper to foreign buyers, resulting in foreign buyers switching expenditure from their own goods and services to the cheaper imports (Appleyard, Field and Cobb, 2010: 575). This is known as the traditional approach. Contrary to the traditional approach, the second theoretical framework presuppose that currency depreciation might have a contractionary effect on output and employment, especially for less economically developed nations. The little gains that might have been achieved through devaluation in the short run, will be wiped away by inflation in the long-run.

The findings in this study reveal that real exchange rate has a negative significant long-run relationship with exports. The results obtained are consistent with those of the view that exchange rate has contractionary effect on trade. Aye, Gupta, Moyo and Pillay (2015) by applying Structural Vector Autoregressive (SVAR) and GARCH-in-Mean (GARCH-M) model came to the same conclusion as in this study.

Thorbecke and Kato (2012) investigated how exchange rate changes affect German exports using quarterly data from 1980Q1 to 2011Q4. Results from Johansen maximum likelihood and Dynamic Ordinary Least Squares (DOLS) estimation indicate that the export elasticity for the unit labour cost-deflated exchange rate equals 0.6. Results from panel DOLS estimation indicate that price elasticities are much higher for consumption goods exports than for capital goods exports and for exports to the eurozone than for exports outside of it. The results obtained suggest that consumer goods exports are more responsive to changes in exchange rate than capital goods exports.

Dincer and kindle (2011) examined the effects of exchange rate fluctuations on 21 exporting firms in Turkey from 1996Q1-2002Q4. Building on a theoretical model that decomposes movements in the exchange rate into anticipated and unanticipated components, the empirical analysis traced the effects through demand and supply channels. The first component of the study revealed that anticipated exchange rate appreciation, in line with movements in underlying fundamentals, has significant adverse effects on export growth across many firms. The second component revealed that random (unanticipated) currency fluctuations (exchange rate shocks) determine both aggregate demand and supply. Unanticipated currency appreciation; a positive shock to the exchange rate, decreases the cost of buying intermediate goods, increasing the output supplied.

Nyeadi, Atiga and Atongenzoya (2014) investigated the impact of exchange rate movement on export growth in Ghana for the period 1990-2012. In the study exchange rate is used as an independent variable while export growth is the dependent variable. Using the OLS estimator, the study finds that exchange rate has no impact on the export of goods and services in Ghana. The study however finds that Gross Domestic Product (GDP), Gross National Saving (GNS), Import Growth (IG) and Total Investment (TI) have significant impact on export.

Bustaman and Jayanthakumaran (2007) investigated the long-run and short-run impacts of exchange rate volatility on Indonesia’s exports of priority commodities to the United States of America over the monthly period 1997-2005. Estimates of cointegration relations are obtained using ARDL bounds testing procedure. Estimates of the short-run dynamics are obtained using an error-correction model. The results obtained shows some significant positive and negative coefficients among the range of commodities. However, in the long-run, majority of commodities tend to support the traditional view as indicated in section 2.

Umaru, Sa’idu, and Musa (2013) employs the ordinary Least Square, Granger causality test, ARCH and GARCH techniques to investigate the impact of exchange rate volatility on export in Nigeria. Using annualised data from 1970-2009. The study further showed that exchange rate is impacting positively on export, as shown by the regression results. The elasticity results revealed that, the demand for Nigerian products in the World market is fairly elastic.

Razin and Collins (1997) studied the real exchange rate misalignments and growth for a large sample of developed and developing countries. The paper used regression analysis to explore whether real exchange rate misalignments are related to country growth rates. Their findings were that, over-valuations lower economic growth. Moderate to high (but not very high) under valuations are associated with more rapid economic growth. The traditional theory of exchange rates supports their findings, in that, depreciations are associated with rapid growth. Conflicting results were obtained in developed countries.

Poonyth and van Zyl (2000) evaluated the long run and short run effects of real exchange rate changes on South African agricultural exports using an Error Correction Model (ECM) within the cointegrated VAR model. The results suggest that there is a unidirectional causal flow from exchange rate to agricultural exports. The empirical findings establish both short-run and long run relationships between real agricultural exports and the real exchange rate.

Aye, Gupta, Moyo and Pillay (2015) examined the impact of real effective exchange rate uncertainty on aggregate exports of South Africa for the period 1986Q4-2013Q2. Using a bivariate framework where the structural vector autoregression is modified to accommodate bivariate GARCH-in-Mean errors (GARCH-M), they found that exchange rate uncertainty has a significant and negative effect on exports in South Africa.

Jordaan and Netshitenzhe (2015) analyse the impact of changes in the exchange rate of the rand on South Africa's export sector. The study was conducted using the Johansen Maximum cointegration technique and an Error Correction Model (ECM) to analyse the long run effects and the short-run dynamics of the effects of changes in the exchange rate on South Africa's export volume, (total exports, manufacturing exports, mining and agricultural exports) for the period 1988-2014. The results show that while there is a long-run equilibrium relationship between the real effective exchange rate (REER) and all the dependent variables (excluding export volumes), a real depreciation of the domestic exchange rate only has a positive long-run effect on manufacturing and mining export performance. In the short run, while the ECM model shows that REER depreciation may increase total exports, mining and manufacturing exports, this is not the case for agricultural exports. The results also show that manufacturing and mining exports are affected more by their previous values than the exchange rate.

Nyahokwe and Ncwadi (2013) investigated the impact of exchange rate volatility on aggregate South African exports flows to the rest of the world for the period 2000 to 2009. The study utilised the Vector Autoregressive (VAR) and Vector Error Correctional Model (VECM) to establish long and short run relationship between exports and exchange rate. The results obtained suggest that, there exist no statistically significant relationship that is there is an ambiguous relationship between South African exports flows and exchange rate.

Nemushungwa, Gyekye and Ocran (2015) empirically investigates the impact of exchange rate volatility on South African exports using the ARDL bounds testing procedure and monthly data for the period 2000 to 2013.Furthermore; it measures real exchange rate volatility and also examines the stability of the long run coefficients and the short-run dynamics. The study results confirm that exchange rate volatility has insignificant negative long run impact on South African exports. Besides, real exchange rate has insignificant negative long-run effects on South African exports. The coefficient of error correction term for exports model, is positive and statistically insignificant and is therefore not supportive of the validity of the long-run equilibrium relationship between the variables.

From the review of empirical literature on exports and exchange rate, it is clear that the findings of studies for both developed and developing countries are conflicting. Therefore, the effect of exchange rate on exports is still a debatable issue. This study will also contribute to the ongoing debate concerning the impact of exchange rate on exports.

3. METHODOLOGY

3.1 Model Specification

The primary purpose of this study is to investigate the impact of real exchange rate on exports in South Africa for the period 1994 to 2016. In the study, the endogenous variable is export (Y) and the exogenous variables are real exchange rate (RER), real interest rate (RIR), inflation (Infl) and investments (invest). Real exchange rate, Real Interest Rate and Inflation are used in the study as control variables to capture the economy as much as possible.

The study follows Arize, Osang and Slottje (2000), De Vita and Abbott (2004), and Todani and Munyama (2005) amongst others; and the model is specified as:

$$Yt = \beta o + \beta 1\ RERt + \beta 2\ RIRt + \beta 3\ Investt + \beta 4\ Inflt + \varepsilon \quad (1)$$

To obtain elasticity coefficients and remove the effect of outliers, the variables must be transformed to logarithm. In log linear form of the function becomes:

$$Log yt = \beta o + \beta 1 log\ RERt + \beta 2\ log RIRt + \beta 3 log\ IogInvestt + \beta 4 log\ Inflt + \varepsilon t \quad (2)$$

Yt is the natural log of exports, *logRERt* is the natural logarithm of real exchange rate, *logRIRt* is the natural logarithm of real interest rate, *logInflt* is the natural logarithm of inflation, and *logInvestt* is the natural logarithm of investment. The error term (ε) is included to represents omitted variables in the specification of the model. The error term is also included to capture all errors of measurements, parameter variations, and errors of the functional approximation and sampling variability.

3.2 Data Source

This study uses annualised data covering the period 1994 to 2016. Exports figures are obtained from the South African Department of Trade and Industry (DTI), data on Interest rate, exchange rates and Fixed Cross Capital Formation (FCF) {Investments} is obtained from the South African Reserve Bank (SARB) publications, and inflation figures are sourced from the South African Department of Statistics (Stats SA).

3.3 Data Analysis

The study borrows data analysis techniques from Todani and Munyama (2005) and Sekantsi (2011) by utilizing the autoregressive distributed lag bounds procedure to determine long run relationship.

3.3.1 Unit Root Test

Owing to the fact that the study employs a time-series data, the first step to begin with, is to test for stationarity. This requires the testing of the order of integration in the data set (unit root test). A time-series is said to be integrated of order I(0), and a variable that must be differenced once to become stationary is said to be integrated of order I(1). A stochastic process is said to be stationary if it's mean and variance are constant over time; and the value of the covariance between two time periods depends only on the distance, gap or lag between the two time periods and not the actual time at which the covariance is computed. A non-stationary time series will have a time-varying mean and/or a time-varying variance (Gujarati 2009:740-741).

For the purpose of this study Augmented Dickey-Fuller (ADF) (1979) and Phillips- Perron (PP) (1988) are used for unit root tests.

3.3.2 Co-integration

The ARDL cointegration approach was developed by Pesaran and Shin (1999) and Pesaran, Shin and Smith (2001). It has three advantages in comparison with other previous and traditional cointegration methods. Firstly, the ARDL does not need all the variables under observation to be integrated of the same order and it can be applied when the under-lying variables are integrated of order one, order zero or fractionally integrated. Secondly, the ARDL test is relatively more efficient in the case of small and finite sample data sizes. Lastly, by applying the ARDL technique, we obtain unbiased estimates of the long-run model (Harris and Sollis, 2003).

The ARDL models employed in this study can be moulded as follows:

$$Y_t = \beta_0 + \beta_1 RER_t + \beta_2 RIR_t + \beta_3 Invest_t + \beta_4 Infl_t + \varepsilon_t \quad (3)$$

Where: $\varepsilon_t = Y - (\beta_0 + \beta_1 RER_t + \beta_2 RIR_t + \beta_3 Invest_t + \beta_4 Infl_t) \quad (4)$

$$\Delta Y_{t-1} = \beta_0 + \beta_1 logY_{t-1} + \beta_2 logRER_{t-1} + \beta_3 logRIR_{t-1} + \beta_4 logInvest_{t-1} + \beta_5 logInfl_{t-1} + \sum_{i=0}^{p} \beta_i Y_{t-i} + \sum_{j=0}^{q} \beta_j RER_{t-j} + \sum_{k=0}^{r} \beta_k RIR_{t-k} + \sum_{l=0}^{s} \beta_l Invest_{t-l} + \sum_{m=0}^{t} \beta_m Infl_{t-m} + \varepsilon_t \quad (5)$$

Where *Δ* is defined as the first difference operator, and T in the equation is the time trend, *ΔYt* is the natural log of exports, *logRERt* is the natural logarithm of real exchange rate, *logRIRt* is the natural logarithm of real interest rate, *logInflt* is the natural logarithm of inflation, and *logInvestt* is the natural logarithm of investment.

This study also estimates the short-run export volume equation using the ARDL Error Correction Model (ECM) approach, as defined in equation (8). Once co-integration is confirmed, we move to the second stage and estimate the long-run coefficients of the level equations (1) and (2) and the short-run dynamic coefficients via the following ARDL error correction models. ECM allows us to estimate the short-run relationship between exports and exchange rate. The larger the error correction coefficient, in absolute value, the faster is the economy's return to its long-run equilibrium once shocked. Estimates of the short-run dynamics are obtained using an error-correction model:

$$\Delta Y_{t-1} = \beta_0 + \beta_1 logY_{t-1} + \beta_2 logRER_{t-1} + \beta_3 logRIR_{t-1} + \beta_4 logInvest_{t-1} + \beta_5 logInfl_{t-1} + \sum_{i=0}^{p} \beta_i Y_{t-i} + \sum_{j=0}^{q} \beta_j\, RER_{t-j} + \sum_{k=0}^{r} \beta_k RIR_{t-k} + \sum_{l=0}^{s} \beta_l Invest_{t-l} + \sum_{m=0}^{t} \beta_m Infl_{t-m} + \pi ECM_{t-1} + \varepsilon_t \quad (6)$$

π = the speed of adjustment parameter and

ECM = the lag residuals that are found from the estimated co-integration model.

If π is negatively significant, then the variables tend to converge to their long run equilibrium.

4. FINDINGS OF THE STUDY

4.1 Descriptive Statistics

Before evaluating the empirical impact of exchange rate on exports, the summary statistics provided in table 4.1 serves as preliminary analysis to glance at some basic characteristics of the data.

The Jarque-Bera tests significantly accept the null hypothesis of normality for all variables, therefore confirming the normal distribution of both real and financial variables used in the study. The kurtosis for two variables, namely Inflation and Real Interest Rate exceed three; this is termed excess kurtosis; and an indication of fat tails in the distribution; while three of the variables are less than three 3. All the variables except exports and Investments are positively skewed.

Table 4.1: Summary of Descriptive Statistics

	Exports	**Infl**	**Invest**	**RIR**	**Fx**
Mean	28.03812	6.284030	12.57706	5.713629	4.710946
Median	28.61524	5.858980	12.55219	4.908468	4.713038
Maximum	35.62244	11.53645	13.65216	12.99255	5.408203
Minimum	21.47420	1.388382	11.28799	1.794189	4.044454
Std. Dev.	3.491952	2.173279	0.779311	3.033029	0.369947
Skewness	-0.073667	0.235693	-0.079311	1.025413	0.184756
Kurtosis	2.483782	3.464683	1.549336	3.012782	2.322353
Jarque-Bera	0.276181	0.419880	2.041216	4.030798	0.570921
Probability	0.871020	0.810633	0.360376	0.133267	0.751668
Sum	644.8768	144.5327	289.2724	131.4135	108.3518
Sum Sq. Dev.	268.2620	103.9091	13.36115	202.3838	3.011930
Observations	23	23	23	23	23

Source: Authors Computation (2017), using eviews.

4.2 Unit Root Test

The significance of unit root test is to avoid result that show statistical significance even when there is lack of meaningful linkage. The Augmented Dickey-Fuller (ADF) and Phillips Perron tests is employed to assess the presence of unit root in the variables. The results for the Augmented Dicky-Fuller are presented in table 4.2(a) and the Philips Perron test are presented in table 4.2(b).

Table 4.2(a): Stationarity results of the Augmented Dickey-Fuller test

Augmented Dickey-Fuller				
Order of integration	**Variable**	**Intercept**	**Trend and intercept**	**None**
Level	Exports	-2.346162 (0.1675)	-3.144882 (0.1210)	0.503286 (0.8162)
1st difference	Exports	-5.141074*** (0.0005)	-5.093848*** (0.0028)	-5.117299*** (0.0000)
Level	Fx	-2.328686 (0.1723)	-2.729965 (0.2356)	-3.765710*** (0.0007)
1st difference	Fx	-3.584616** (0.0155)	-3.665577** (0.0481)	-2.984738*** (0.0073)
Level	Inflation	-3.922508*** (0.0075)	-3.911116** (0.0301)	-1.097281 (0.2384)
1st difference	Inflation	-4.884500**** (0.0012)	-4.906650*** (0.0054)	-5.002743*** (0.0000)
Level	Investment	-1.041536 (0.7194)	-1.830320 (0.6552)	4.665794 (1.0000)
1st difference	Investment	-5.060960*** (0.0006)	-5.019475*** (0.0033)	-1.598509 (0.1017)
Level	Real Interest R	-1.896112 (0.3278)	-3.228904 (0.1046)	-0.943014 (0.2975)
1st difference	Real Interest R	-5.714892*** (0.0001)	-5.562889*** (0.0011)	-5.852844*** (0.0000)
1%	Critical values	-3.769597	-4.440739	-2.674290
5%		-3.004861	-3.632896	-1.957204
10%		-2.642242	-3.254671	-1.608175
Values marked with a *** represent stationary variables at 1% significance level, and ** represent stationary at 5% and * represent stationary variables at 10%.				

Table 4.2(b) shows the Augmented Dicky-Fuller results. The test has a null hypothesis of unit root. The derived ADF t-statistic was compare with the t-critical value. The decision rule for

unit root tests is that, if the calculated t-statistic is greater than critical value we do not reject null hypothesis that series contains a unit root, thus confirming that series are stationary. For variables in level, the test in intercept, intercept and trend revealed that all variables are not stationary except inflation; this is reflected by the none-rejection of null hypothesis at 1%, 5% and 10% significance level, inflation being the only variable that is stationary. All the variables are significantly stationary at first difference at 1%, 5%, and 10% except Investments; hence the rejection of null hypothesis.

Table 4.2 (b): Stationarity results of the Phillips-Perron test

Phillips-Perron				
Order of integration	**Variable**	**Intercept**	**Trend and intercept**	**None**
Level	Exports	-2.245005 (0.1973)	-2.986661 (0.1576)	1.221052 (0.9379)
1st difference	Exports	-6.707401*** (0.0000)	-7.333648*** (0.0000)	-5.798316*** (0.0000)
Level	Fx	-2.428850 (0.3584)	-2.428850 (0.3584)	-3.727364*** (0.0007)
1st difference	Fx	-3.515642*** (0.0179)	-3.584025* (0.0560)	-2.912137*** (0.0057)
Level	Inflation	-2.913137* (0.0599)	-2.697932 (0.2465)	-0.983310 (0.2813)
1st difference	Inflation	-6.111850*** (0.0001)	-6.771232*** (0.0001)	-5.958820*** (0.0000)
Level	Investments	-1.079258 (0.7050)	-1.975519 (0.5819)	5.002345 (1.0000)
1st difference	Investments	-5.060594*** (0.0006)	-5.016823*** (0.0033)	-2.902854*** (0.0059)
Level	Real Interest R	-1.944690 (0.3072)	-3.223586 (0.1056)	-0.857903 (0.3329)
1st difference	Real Interest R	-5.731172*** (0.0001)	-5.575431*** (0.0011)	-5.865058*** (0.0000)
1%	Critical values	-3.769597	-4.440739	-2.674290

5%		-3.004861	-3.632896	-1.957204
10%		-2.642242	-3.254671	-1.608175
Values marked with a *** represent stationary variables at 1% significance level, and ** represent stationary at 5% and * represent stationary variables at 10%.				

Source: Authors Computation (2017), using eviews.

Table 4.2(b) show the Philips Perron results. The null hypothesis under the Philips Perron test is the same as Augmented Dicky-Fuller. For variables in levels, the test in intercept, intercept and trend and none revealed that none of the variables are stationary except exchange rate.

Both methods used to test for stationarity significantly revealed that the data series were nonstationary in levels and stationary when first differenced, except for two exceptional cases were inflation and exchange were found to be integrated of order I(0) at level. Therefore, the series are integrated of the same order I(1).

4.3 Co-integration

Once the order of integration is established, the results indicate that long-run co-integration test can be performed. The first step is to determine the existence of a long-run relationship between variables by applying an ARDL bounds test. Table 4.3 shows the ARDL bounds test results.

Table 4.3- ARDL BOUNDS TEST

Test Statistic	Value	k		
F-statistic	12.88649	4		
Critical Value Bounds				
Significance	I0 Bound	I1 Bound		
10%	2.2	3.09		
5%	2.56	3.49		
2.5%	2.88	3.87		
1%	3.29	4.37		

Source: Authors Computation (2017), using eviews.

The results obtained from ARDL bounds test and the estimated F-test indicate the presence of long run relationship amongst variables. The decision rule is based on the F-statistics (**12.88649**) that is above the upper bound critical value of **4.37**, at 1% level of significance; as such we reject the null hypothesis of no cointegration. The results of the bounds test are consistent with those that were found by Nemushungwa, Gyekye and Ocran (2015).

Table 4.4: ARDL Co-integration Test

Variable	Coefficient	Standard error	t-statistic	Prob
Constant	45.66487	12.38296	3.687720	0.0024
LOG_Exp		-	-	
LOG_Fx	-0.094375	0.017566	-5.372515	(0.0001)
LOG_RIR	0.036571	0.144832	0.252509	(0.8043)
LOG_Invest	5.690838	2.995656	1.899697	(0.0783)
LOG_Infl	0.557878	0.135235	4.12	(0.0010)

Source: Authors Computation (2017), using eviews.

The long run impact of exchange rates on exports as presented in table 4.4 is shown using the equation below

$$Exp=45.66487-0.094375FX+0.036571RIR+5.690838INV+0.0557878INFL \quad (7)$$

Equation 9 shows that RIR, INV and INFL have a positive long relationship with EXP. The equation also shows that FX has negative long run relationship with exports. Only RIR and INV are statistically insignificant with FX and INFL being statistically significant. The obtained results suggest that a unit increase in FX which is a depreciation of the domestic currency against the top 20 trading partners will render a decrease of approximately **0.094375** in exports. As alluded in the literature review, depreciation of domestic currency increases input cost through high cost of imported material and specialised skills not readily available in the domestic country.

In the long run a unit increase in Real Interest Rate will induce exports by **0.0365714.** This is because higher interest rate attracts Foreign Direct Investments (FDI) and some other local investments. An increase in investments by foreign investors will mean that international capital movement is directed to South Africa, more jobs will be created, and production will have improved leading to increase in total output.

The empirical result obtained from ARDL show that for a unit increase in investments, exports will increase by approximately **5.690838**. Investment include both investment by private and public sector. Investment by private sector would be an increase in the flow of international capital into the South African economy leading to expansion in production lines, acquiring of more efficient machinery and hiring of highly skilled personnel. Investment by Public Sector is mainly investment in public infrastructure such as roads, railways and harbours to mention a few.

The real exchange rate has already factored in inflation in that, the nominal exchange rate is inflation adjusted to get real exchange rate. The study included inflation as a control variable in order to capture the aggregate economy as much as possible. The variable was also included to test the prior expectation that inflation has an inverse relationship with exports. The results obtained are conflicting with theory; the study found a positive significant relationship between inflation and exports (a unit increase in inflation will increase exports by **0.557878**).

Table 4.5: Short-Run Relationship and Error correction model results

Variable	**Coefficient**	**Standard error**	**t-statistic**
(LOG_Fx)	-0.076203	0.0114070	-6.883724
(LOG_RIR)	0.450457	0.097750	4.608266
(LOG_Invest)	-0.221343	0.613567	-0.360747
(LOG_Infl)	-0.073236	0.111847	-0.654786
CointE(-1)*	-1.238472	0.120901	-10.24367

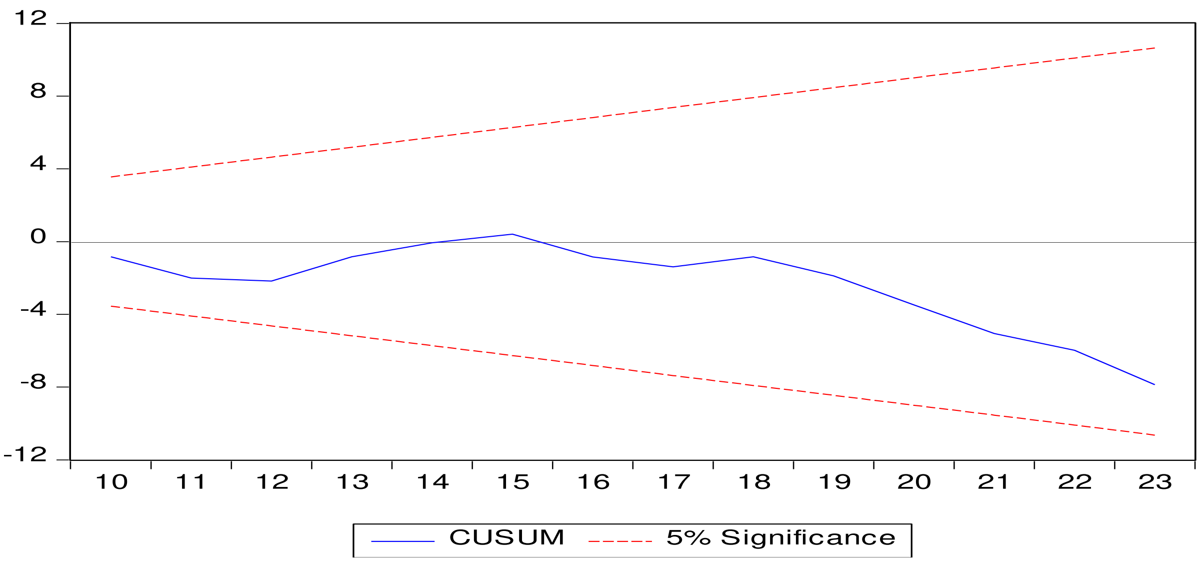
Source: Authors Computation (2017), using eviews.

The coefficient of error correction term, **-1.238472**, is negative and statistically insignificant and is therefore not supportive of the validity of the long-run equilibrium relationship between the variables. The coefficient is also very small; suggesting a very slow adjustment process and indicate what proportion of the disequilibrium is corrected each year. The absolute value of the coefficient implies that about 1.238472 percent of the disequilibrium of the previous year's shock adjusts back to equilibrium in the current year

4.4 Parameter Stability Test

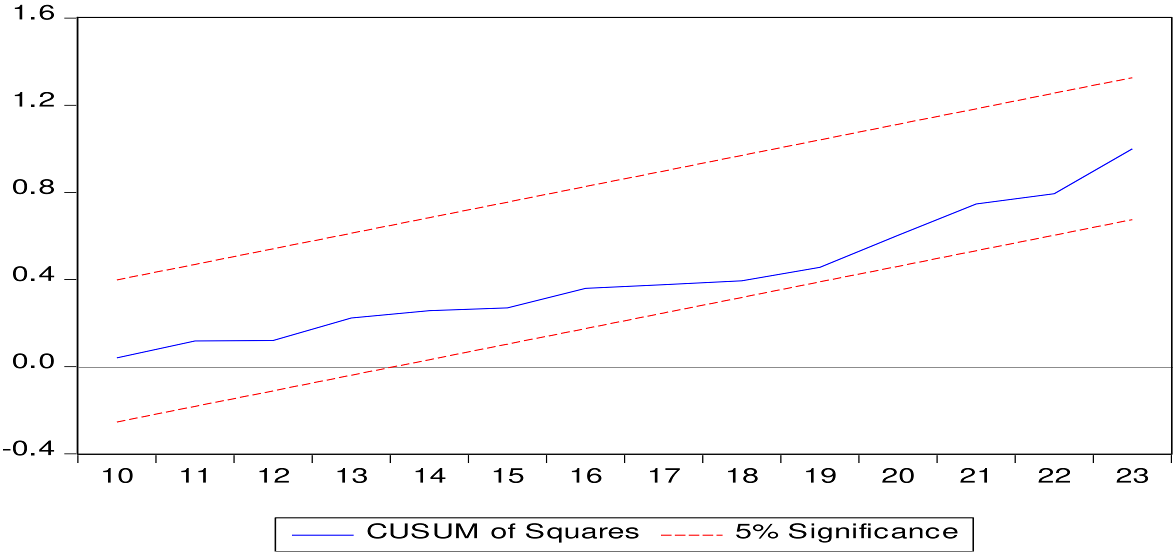
Cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ), proposed by Brown, Durbin and Evans (1975). The CUSUM test uses the cumulative sum of recursive residuals based on the first set of observations and is updated recursively and plotted against break points. If the plot of CUSUM statistics stays within the critical bounds of 5 percent significance level (represented by a pair of red straight lines drawn at the 5 percent level of significance), the null hypothesis that all coefficients in the error correction model are stable cannot be rejected. If either of the lines is crossed, the null hypothesis of coefficient constancy can be rejected at the 5 percent level of significance Brown et al. (1975). A similar procedure is used to carry out the CUSUMSQ test, which is based on the squared recursive residuals. Based on the result obtained as indicated in table 4.3(a) and table 4.3(b) we fail to reject the null hypothesis of perfect parameter stability.

Figure 4.2 (a): CUSUM TEST



Source: Authors Computation (2017), using eviews.

Figure 4.2 (b): CUSUM SQUARES TEST



Source: Authors Computation (2017), using eviews.

5. CONCLUSION

The purpose of this study was to investigate the relationship between exchange rate and exports in South Africa from 1994 to 2016 using annualised time-series data. The study employed the Autoregressive distributed lad (ARDL) model to determine the long run relationship among variables. The study begun with a hypothesis that, real exchange rate significantly impact exports. The hypothesis follows the traditional approach view, which became the initial point of investigation as explained.

The current South African free floating exchange rate policy was adopted post the collapse of the Britton woods fixed exchange rate regime. The country now has a flexible exchange rate system in an inflation targeting monetary policy framework. From the empirical analysis, the study found that exchange rate have a negative significant impact on exports, and that, any misalignment (deliberate undervaluation or overvaluation of domestic currency) of exchange rate will course havoc in the market. The policy implication is that, government should avoid exchange rate misalignment at all cost. This is because exchange rate misalignment distort the markets, and the little gains achieved in the short run through undervaluation will be wiped away by inflation in the long run. The best policy to exchange rate is to leave the determination of exchange rate to market forces.

From the results obtained, the study commends the current free floating exchange rate in an inflation target as adopted by the South African Reserve Bank (SARB) in February 2000; however, the only cost with that is a very volatile domestic currency which could hinder exports.

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